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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/606,437	06/25/2003	Leping Huang	883.0007.U1(US)	6335

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HARRINGTON & SMITH, LLP
4 RESEARCH DRIVE
SHELTON, CT 06484-6212

EXAMINER	
NG, CHRISTINE Y	
ART UNIT	PAPER NUMBER
2616	

DATE MAILED: 11/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/606,437	HUANG, LEPING	
	Examiner	**Art Unit**	
	Christine Ng	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 29 August 2006.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-6,10-15,18,20,21,23-27 and 32-35 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-6,10-15,18,20,21,23-27 and 32-35 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 25 June 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 6 and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 6, it is unclear why the equations for the connectivity metrics in lines 19-28 is defined as B_i/B_o, when the connectivity metric is the ratio of the maximum link bandwidth to the estimated link bandwidth (B_o/B_i).

In claim 18, it is unclear why the equations for the connectivity metrics in lines 20-29 is defined as B_i/B_o, when the connectivity metric is the ratio of the maximum link bandwidth to the estimated link bandwidth (B_o/B_i).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4, 11-14, 21, 23-26 and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,084,858 to Matthews et al in view of U.S. Patent No. 4,912,702 to Verbiest, and in further view of U.S. Patent No. 6,535,498 to Larsson et al.

Referring to claim 1, Matthews et al disclose in Figure 2A a method for routing data packets in a network, comprising:

Estimating a link bandwidth (used_bandwidth(e)) of at least one network node (source A). Refer to Column 8, line 65 to Column 9, line 8.

Calculating (Step 16) a connectivity metric ($Z_p(i)$) based on the estimated link bandwidth (used_bandwidth(e)). Refer to Column 4, lines 44-48 and Column 8, line 65 to Column 9, line 8.

Distributing (using a traversal value vector) information concerning the calculated connectivity metric ($Z_p(i)$), using a routing protocol packet (traversal value vector). "Each element of the vector corresponds to a current value for one of the metrics" and "each time a destination node is discovered, a traversal value vector is updated for each node" (Column 6, lines 6-16). The traversal value vector is a "routing protocol packet" in that its metrics are updated as it traverses through a path from a source to a destination, so that the metrics can be used to determine the best path. Refer to Column 6, lines 35-39 and Column 7, lines 12-18.

Using the calculated connectivity metric ($Z_p(i)$), determining (Step 18) a route having a maximum link bandwidth and a minimum traffic load. After all paths are evaluated by the traversal value vectors, "the path which best fits the desired result for presentation is selected". Refer to Column 4, lines 50-54 and Column 7, lines 12-18 and 28-64.

Matthews et al do not disclose wherein the connectivity metro is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth.

Verbiest disclose in Figure 1 a method of transporting a packet from a source to a destination through a switching network. When a stream from RX1 is to be multiplexed onto an output terminal T1, the corresponding processor TPR1 of TX1 calculates the estimated output bandwidth B2 and compares this bandwidth with the maximum bandwidth B allowable on the output terminal T1. The comparison between the estimated bandwidth B2 and the maximum bandwidth B is made to ensure that the estimated bandwidth B2 on the output T1 does not exceed the maximum allowable bandwidth B. If B2 does not exceed B, the packet in RX1 is transmitted to TX1. If B2 exceeds B, the path set up packet searches for another path through the network. Also, it can be checked if the B2 is below a predetermined percentage, e.g. 80%, of B. Refer to Column 1, line 55 to Column 2, line 7; and Column 5, line 67 to Column 6, line 53. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include wherein the connectivity metro is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth. One would be motivated to do so in order to ensure that there will be enough available bandwidth to accommodate the data packet transmission, using the estimated bandwidth value.

Matthews et al also do not disclose that the method is used in a wireless network.

Larsson et al disclose in Figure 4 a method of selecting optimal routes between nodes in a wireless Bluetooth ad-hoc piconet. "These routes may be more optimal than the original route in terms of fewer hops between the source node and the destination node or in terms of dropped packets and network delays along the original route"

(Column 3, lines 47-50). A source node requests for an updated route to the destination node during a predetermined event. The predetermined event could be when the traffic throughput along the original route falls below a predetermined threshold value, when the number of intermediate nodes in the original route exceeds a predetermined number, or when the number of routes which flow through a node is above a predetermined threshold. Refer to Column 2, lines 22-45; Column 3, lines 19-50; and Column 4, line 62 to Column 5, line 32. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the method is used in a wireless network, the motivation being in order to facilitate routing in a wireless network by finding the most efficient route for data transmissions.

Referring to claim 2, Matthews et al do not specifically disclose that the estimating uses a model of a network medium access control MAC algorithm.

However, Matthews et al disclose that each packet has a source MAC address and a destination MAC address to designate the route of the packet. If a packet has multiple different paths, the best path is determined by factors such as bandwidth. Furthermore, the path of the packet is needed in order for the system to estimate the bandwidth required to route the packet to its destination. Refer to Column 1, lines 27-30 and Column 1, line 66 to Column 2, line 21. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the estimating uses a model of a network medium access control MAC algorithm, the motivation being that the MAC addresses specify the source and destination of the

packet, so that the system can determine a path and estimate the bandwidth needed to route the packet.

Referring to claim 3, refer to the rejection of claim 1 and claim 2.

Referring to claim 4, refer to the rejection of claim 1. Furthermore, Verbiest disclose that the maximum link bandwidth (B) is the link bandwidth between a Master node (source SEND connected to corresponding port RX1) and a Slave node (destination RECEIVE connected to corresponding port TX1) when there is only one slave node connected to the master node. When a stream from RX1 is to be multiplexed onto an output terminal T1, the corresponding processor TPR1 of TX1 calculates the estimated output bandwidth B2 and compares this bandwidth with the maximum bandwidth B allowable on the output terminal T1. When doing the calculation, there is only one slave node (TX1) connected to master node (RX1). Refer to Column 1, line 55 to Column 2, line 7; and Column 5, line 67 to Column 6, line 53.

Referring to claim 11, Matthews et al disclose in Figure 3 a computer program embodied on a computer readable medium (memory 192) and comprising computer program code segments for use by at least one data processor (CPU 191) when implementing a routing protocol in a network. Refer to Column 10, lines 7-18. Furthermore, Matthews et al disclose sending information concerning a calculated connectivity metric (Zp(i)) to at least one other network node using a routing protocol packet (traversal value vector). "The node reports to the model what the metric values are for the node and the arcs that originate from it". Refer to Column 6, lines 6-16. Refer also to the rejection of claim 1.

Matthews et al do not specifically disclose a first computer program code, a second computer program code, a third computer program code and a further computer code to perform the steps defined in claim 1.

However, Matthews et al disclose that the memory 192 "contains a computer program or data structure for providing to a general purpose computer instructions and data for carrying out the methods". Refer to Column 10, lines 14-18. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a first computer program code, a second computer program code and a third computer program code to perform the steps defined in claim 1, the motivation being that each step of the process requires a separate set of computer instructions.

Matthews et al also do not disclose wherein the connectivity metro is defined as a ratio of a maximum link bandwidth to the estimated link bandwidth. Refer to the rejection of claim 1.

Matthews et al also do not disclose that the computer program is used in a wireless network. Refer to the rejection of claim 1.

Referring to claim 12, refer to the rejection of claim 2.

Referring to claim 13, refer to the rejection of claim 3.

Referring to claim 14, refer to the rejection of claim 4 and claim 11.

Referring to claim 21, Matthews et al disclose receiving information concerning a calculated connectivity metric ($Z_p(i)$) from at least one other network node. "As each node is discovered, a traversal value vector is recorded for that node", with the traversal

vector including the current value for one of the metrics of the previous nodes in the discovered path. Refer to Column 6, lines 6-16.

Referring to claim 23, refer to the rejection of claim 1 and claim 11.

Referring to claim 24, refer to the rejection of claim 2.

Referring to claim 25, refer to the rejection of claim 3.

Referring to claim 26, Verbiest disclose that the maximum link bandwidth (B) is the link bandwidth between a Master node (source SEND connected to corresponding port RX1) and a Slave node (destination RECEIVE connected to corresponding port TX1) when there is only one slave node connected to the master node. When a stream from RX1 is to be multiplexed onto an output terminal T1, the corresponding processor TPR1 of TX1 calculates the estimated output bandwidth B2 and compares this bandwidth with the maximum bandwidth B allowable on the output terminal T1. When doing the calculation, there is only one slave node (TX1) connected to master node (RX1). Refer to Column 1, line 55 to Column 2, line 7; and Column 5, line 67 to Column 6, line 53.

Referring to claims 32 and 33, Matthews et al do not disclose wherein the wireless network is comprised of a plurality of mobiles nodes.

Larsson et al disclose in Figure 3 a method of selecting optimal routes between wireless nodes in a wireless Bluetooth ad-hoc piconet. For example, piconet 1 has mobile slave nodes 301, 302 and 304. Refer to Column 1, lines 31-49; and Column 2, lines 1-21. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include wherein the wireless network is comprised

of a plurality of mobiles nodes. One would have been motivated to do so since mobile nodes communicate with each other in a wireless network.

Referring to claims 34 and 35, Matthews et al do not disclose that the wireless network comprises an inter-piconet/intra-piconet network of mobile nodes.

Larsson et al disclose in Figure 3 a method of selecting optimal routes between wireless nodes in a wireless Bluetooth ad-hoc piconet. Piconets 1, 2 and 3 form an inter-piconet/intra-piconet network of mobile nodes since they are connected through nodes 304 and 308. Refer to Column 1, lines 31-49; and Column 2, lines 1-21. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that the wireless network comprises an inter-piconet/intra-piconet network of mobile nodes. One would have been motivated to do so in order to transfer information between mobile nodes of different piconets.

5. Claims 10 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,084,858 to Matthews et al in view of U.S. Patent No. 4,912,702 to Verbiest in view of U.S. Patent No. 6,535,498 to Larsson et al, and in further view of U.S. Publication No. 2003/0043746 to Hiroyuki et al.

Referring to claim 10, refer to the rejection of claim 1.

Matthews et al do not disclose that distributing information concerning the calculated connectivity metric comprises inserting the value of the connectivity metric (ratio of maximum link bandwidth to estimated link bandwidth) into a routing protocol packet in conjunction with the value of a hop number.

Hiroyuki et al disclose that finding an optimum path between nodes in a network comprises using a metric to compare paths. The metric can be the number of hops or the bandwidth, the goal of which is to minimize the metric in choosing a path. Refer to Paragraph 0006 and 0051. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that distributing information concerning the calculated connectivity metric comprises inserting the value of the connectivity metric into a routing protocol packet in conjunction with the value of a hop number; the motivation being that the ratio of maximum link bandwidth to estimated link bandwidth can also be used as a metric to determine the optimum path, in addition to the number of hops. A path is more likely to be selected if its estimated link bandwidth does not exceed the maximum link bandwidth, in order to support the data packet transmission.

Referring to claim 20, Matthews et al do not disclose that distributing information concerning the calculated connectivity metric comprises inserting the value of the connectivity metric (ratio of maximum link bandwidth to estimated link bandwidth) into a routing protocol packet in conjunction with the value of a hop number.

Hiroyuki et al disclose that finding an optimum path between nodes in a network comprises using a metric to compare paths. The metric can be the number of hops or the bandwidth, the goal of which is to minimize the metric in choosing a path. Refer to Paragraph 0006 and 0051. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that distributing information concerning the calculated connectivity metric comprises inserting the value of the

connectivity metric into a routing protocol packet in conjunction with the value of a hop number; the motivation being that the ratio of maximum link bandwidth to estimated link bandwidth can also be used as a metric to determine the optimum path, in addition to the number of hops. A path is more likely to be selected if its estimated link bandwidth does not exceed the maximum link bandwidth, in order to support the data packet transmission.

6. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,084,858 to Matthews et al in view of U.S. Patent No. 4,912,702 to Verbiest in view of U.S. Patent No. 6,535,498 to Larsson et al, and in further view of U.S. Publication No. 2003/0119538 to Momosaki et al.

Refer to the rejection of claim 4.

Matthews et al do not disclose that estimating includes a consideration of a number of, and the role played by, other nodes that are coupled to the at least one node, where the role comprises one of a master (M), a slave (S), and a participant in multiple piconet (PMP).

Momosaki et al disclose estimating the amount of bandwidth needed in a system by determining the node's status (master or slave) and the number of the node's slaves. The total bandwidth is divided equally amongst the master and all the slaves. If the bandwidth required by each node increases, some slaves may have to be disconnected to order to accommodate the bandwidth requirement changes. Also, since the bandwidth is shared equally amongst all nodes, the number of slaves cannot increase, so the number of the node's slaves must be known to ensure that it does not go over

the bandwidth threshold. Momosaki et al also disclose considering whether a node is a master node or a slave node. The upstream device becomes a master and the downstream devices become slaves. Refer to Paragraphs 0075-0076. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that estimating includes a consideration of a number of, and the role played by, other nodes that are coupled to the at least one node, where the role comprises one of a master (M), a slave (S), and a participant in multiple piconet (PMP). One would be motivated to do so in order to determine the network topology and to determine the number of slaves and bandwidth required in the network, since the total bandwidth cannot exceed the network bandwidth. The total amount of bandwidth required by all the nodes must not exceed the total amount of bandwidth provided to the system, which must be shared equally amongst all nodes.

Response to Arguments

7. Applicant's arguments filed August 29, 2006 have been fully considered but they are not persuasive.

Referring to the argument of claims 1-4, 11-14, 21 and 23-26 (page 12, line 18 to page 14, line 2):

Verbiest disclose in Figure 1 a method of transporting a packet from a source to a destination through a switching network. When a stream from RX1 is to be multiplexed onto an output terminal T1, the corresponding processor TPR1 of TX1 calculates the estimated output bandwidth B2 and compares this bandwidth with the maximum bandwidth B allowable on the output terminal T1. The comparison between

the estimated bandwidth B2 and the maximum bandwidth B is made to ensure that the estimated bandwidth B2 on the output T1 does not exceed the maximum allowable bandwidth B. If B2 does not exceed B, the packet in RX1 is transmitted to TX1. If B2 exceeds B, the path set up packet searches for another path through the network. Refer to Column 1, line 55 to Column 2, line 7; and Column 5, line 67 to Column 6, line 53. The output bandwidth reads on the estimated link bandwidth at a particular output port. Before transmission through the output port, it has to be ensured that there will be enough available bandwidth to accommodate the data packet transmission, using the estimated bandwidth value. If there is not enough bandwidth at the particular output port, another link to another output port needs to be chosen.

Larsson et al disclose in Figure 4 a method of selecting optimal routes between nodes in a wireless Bluetooth ad-hoc piconet. "These routes may be more optimal than the original route in terms of fewer hops between the source node and the destination node or in terms of dropped packets and network delays along the original route" (Column 3, lines 47-50). A source node requests for an updated route to the destination node during a predetermined event. The predetermined event could be when the traffic throughput along the original route falls below a predetermined threshold value, when the number of intermediate nodes in the original route exceeds a predetermined number, or when the number of routes which flow through a node is above a predetermined threshold. Refer to Column 2, lines 22-45; Column 3, lines 19-50; and Column 4, line 62 to Column 5, line 32. The method of Matthews et al can therefore be applied to a wireless environment since nodes in an ad-hoc piconet also need to find

the most efficient route for data transmissions. Matthews et al also suggests that the method can be applied to any communication network, whether or not the network is connection-oriented. Refer to Column 4, lines 32-38.

Referring to the argument of claims 10 and 20 (page 14, line 3 to page 15, line 6): Hiroyuki et al disclose that finding an optimum path between nodes in a network comprises using a metric to compare paths. The metric can be the *number of hops* or the *bandwidth*, the goal of which is to minimize the metric in choosing a path. Refer to Paragraph 0006 and 0051. Matthews et al also discloses using bandwidth to choose an optimal path, particularly, the ratio of maximum link bandwidth to estimated link bandwidth. Therefore, both bandwidth and number of hops can be used in determining optimal paths.

Referring to the argument of claim 27 (page 15, lines 7-27): Momosaki et al disclose estimating the amount of bandwidth needed in a system by determining the node's status (master or slave) and the number of the node's slaves. The total bandwidth is divided equally amongst the master and all the slaves. If the bandwidth required by each node increases, some slaves may have to be disconnected to order to accommodate the bandwidth requirement changes. Also, since the bandwidth is shared equally amongst all nodes, the number of slaves cannot increase, so the number of the node's slaves must be known to ensure that it does not go over the bandwidth threshold. Momosaki et al also disclose considering whether a node is a master node or a slave node. The upstream device becomes a master and the downstream devices become slaves. Refer to Paragraphs 0075-0076. Determining a nodes status as a

slave or master is necessary in order to determine the bandwidth required in the network, since the total bandwidth cannot exceed the network bandwidth. The total amount of bandwidth required by all the nodes must not exceed the total amount of bandwidth provided to the system, which must be shared equally amongst all nodes.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine Ng whose telephone number is (571) 272-3124. The examiner can normally be reached on M-F; 8:00 am - 5:00 pm.

9. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571) 272-3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

C. Ng CN
October 30, 2006

HUY D. VU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600